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Flora Assessment

of

The Remainder of Portion 52 of the farm Tamboekiesfontein 173-IR (Magagula Heights)

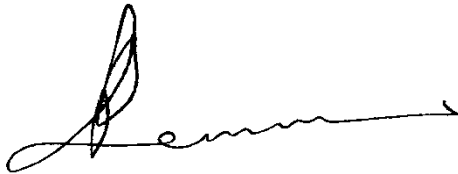
May 2017

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DECLARATION OF INDEPENDENCE

I, Petro Lemmer (440129 0025 085) declare that I:

- am committed to biodiversity conservation but concomitantly recognize the need for economic development. Whereas I appreciate the opportunity to also learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them
- abide by the Code of Ethics of the S.A. Council for Natural Scientific Professions
- act as an independent specialist consultant in the field of botany
- am subcontracted as specialist consultant by Galago Environmental CC for the proposed Magagula Heights development project described in this report
- have no financial interest in the proposed development other than remuneration for work performed
- have or will not have any vested or conflicting interests in the proposed development
- undertake to disclose to Galago Environmental CC and its client as well as the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations, 2014.



Petro Lemmer - Pr.Sci.Nat. (400567/15)

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1. INTRODUCTION

Galago Environmental was appointed to conduct a vegetation survey on the Remainder of Portion 52 of the farm Tamboekiesfontein 173-IR (also known as Magagula Heights), scheduled for residential development. The objective was to determine which species occur on the site. Special attention had to be given to possible habitats of all the Red List species that may occur in the area. This survey focuses on the current status of threatened plant species occurring, or which are likely to occur on the study site, and a description of the available and sensitive habitats on the site and within 200 meters of the boundary of the site.

2. OBJECTIVES OF THE STUDY

- To assess the current status of the habitat component and current general conservation status of the area;
- To list the perceptible flora of the site and to recommend steps to be taken should threatened plant species, plant species of conservation concern or protected plant species be found;
- To highlight potential impacts of the development on the flora of the proposed site; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed development be approved.

3. SCOPE OF STUDY

This report:

- Pertains to the study site as described in subsection 4.2 and is not meant as a report of the general vegetation of the area (subsection 4.1).
- Lists the more noticeable trees, shrubs, herbs, geophytes and grasses observed during the study;
- Indicates medicinal plants recorded and lists alien species;
- Comments on connectivity with natural vegetation on adjacent sites;
- Comments on ecological sensitive areas;
- Evaluates the conservation importance and significance of the site with special emphasis on the current status of resident threatened species; and
- Offers recommendations to reduce or minimise impacts, should the proposed development be approved

4. STUDY AREA

4.1 Regional vegetation

The study site lies in the quarter degree square 2628AC (Alberton). Mucina & Rutherford (2006) classified the area as Tsakane Clay Grassland, a short, dense grassland on flat to slightly undulating plains and low hills. A mixture of grasses such as *Themeda triandra*, *Elionurus muticus* and *Eragrostis* species dominates the vegetation. The area has strongly seasonal summer rainfall with very dry winters and frequent winter frosts.

The Tsakane Clay Grassland vegetation unit is considered endangered. Its conservation target is 24%. Only 1,5% is conserved in statutory reserves and a few private nature reserves. More than 60% of the unit is already transformed by cultivation, urbanization, mining, dam-building and roads.

4.2 The study site

The 12,1351 ha study site lies north of Road R550 and west of, and abuts, Road D817 (Magagula Heights Road). Its western boundary abuts the existing Magagula Heights Township (Figure 1).

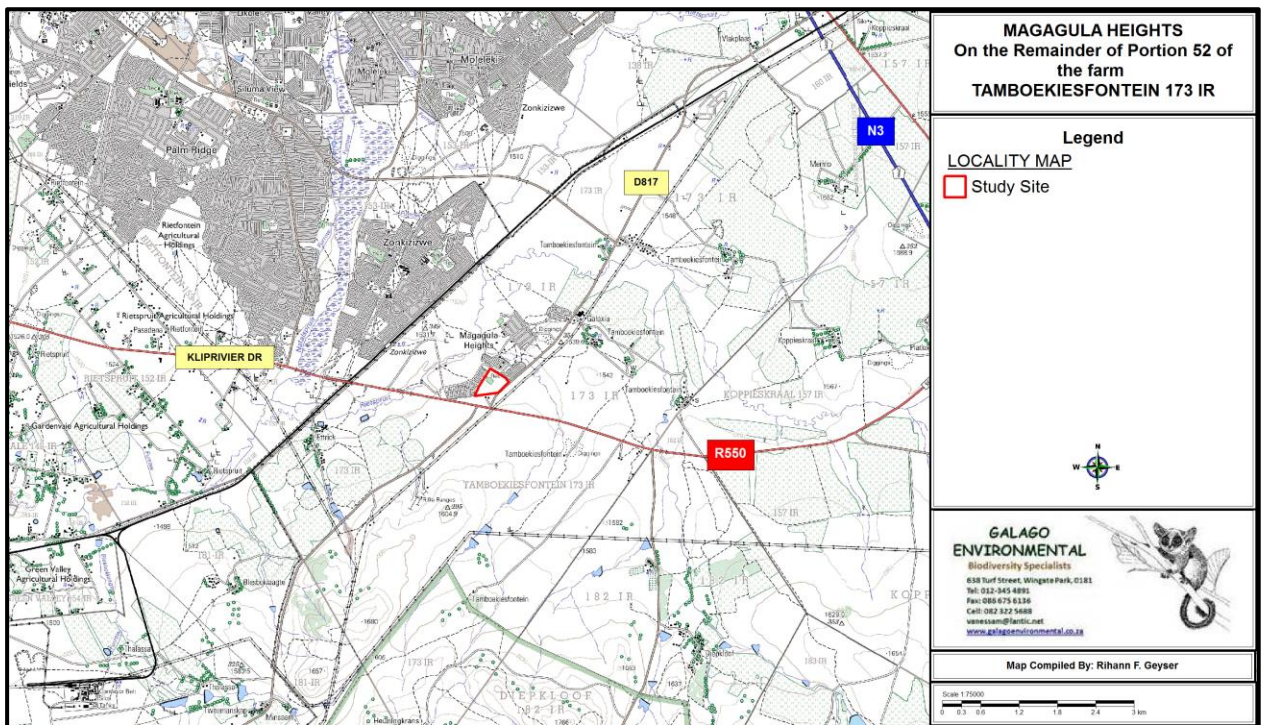


Figure 1: Locality map of the study area

According to the GDARD C-Plan 3.3 the site is situated within a Critical Biodiversity Area with an Ecological Support Area in the area designated “Recreational area” along the western boundary of the site in Figure 3 (Figure 2).

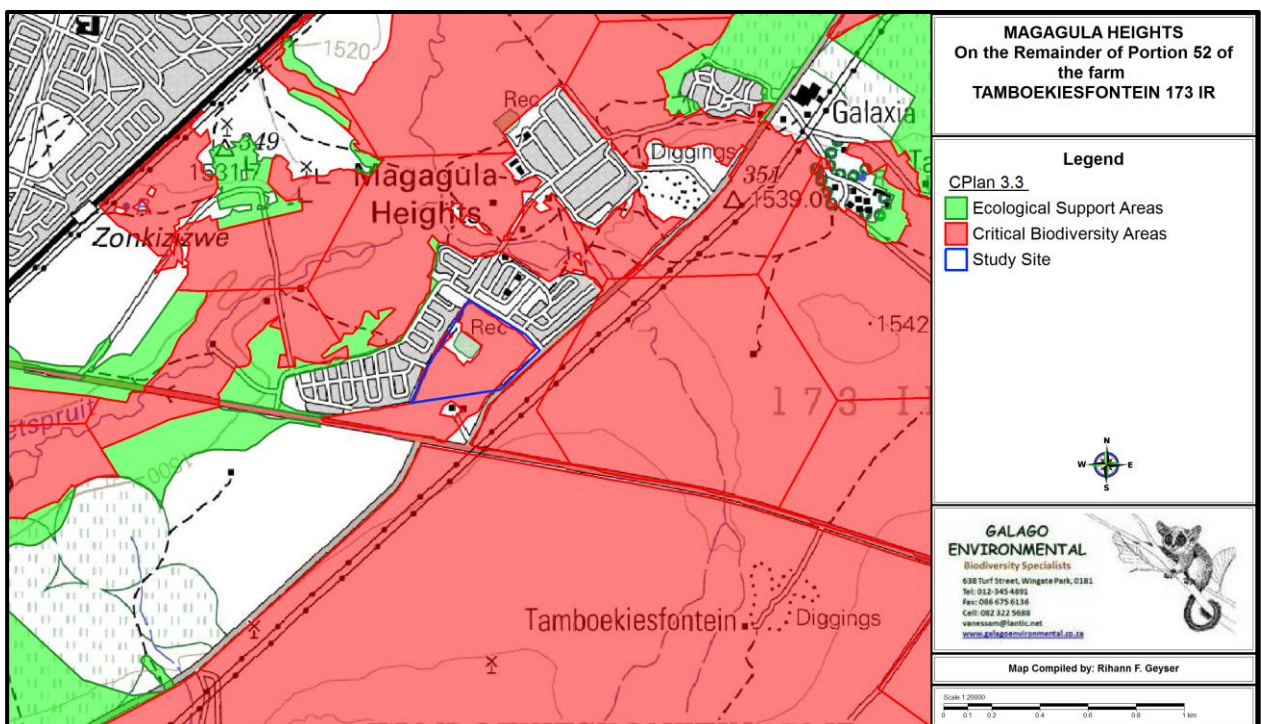


Figure 2: Critical Biodiversity Area and Ecological Support Area.

5. METHOD

A desktop study of the habitats of the Red List and Orange List species known to occur in the area was done before the site visit. Information about the Red List and Orange List plant species that occur in the area was obtained from GDARD. Various Acts and Ordinances were consulted about the protected plant species and species of special concern that might occur on the site (Section 11). The Guidelines issued by GDARD to plant specialists as well as various publications (Section 11) and the local herbaria were consulted about the habitat preferences of the Red and Orange List species concerned and to verify identification of some plant species.

The list of plants recorded in the 2628AC quarter degree square was obtained from SANBI and consulted to verify the record of occurrence of the plant species seen on the site. The important taxa listed by Mucina and Rutherford (2006) were also taken into account. Locality maps were obtained from Planet GIS and information about the Critical Biodiversity Areas and Ecological Support Areas were obtained from the GDARD C-Plan 3.3.

The study site was visited on 17 May 2017 to determine whether the site has suitable habitat for the Red List species known to occur in the quarter degree square and to survey the flora present on the site.

Different study units were identified (Figure 3) and one or more plots, depending on the size and composition of the study unit, were selected at random from each study unit for detailed study. Each plot, which measured about 10m x 10m, was surveyed in a random crisscross fashion and the plants recorded. Areas where there is suitable habitat for the Red List species known to occur in the quarter degree square were examined in detail. The site was examined to determine whether it has suitable habitat for protected trees and other protected species.

Neighbouring properties that have suitable habitat for Red List species were examined, where accessible, to a distance of 200 m from the boundaries of the study site for the presence of such plant species.

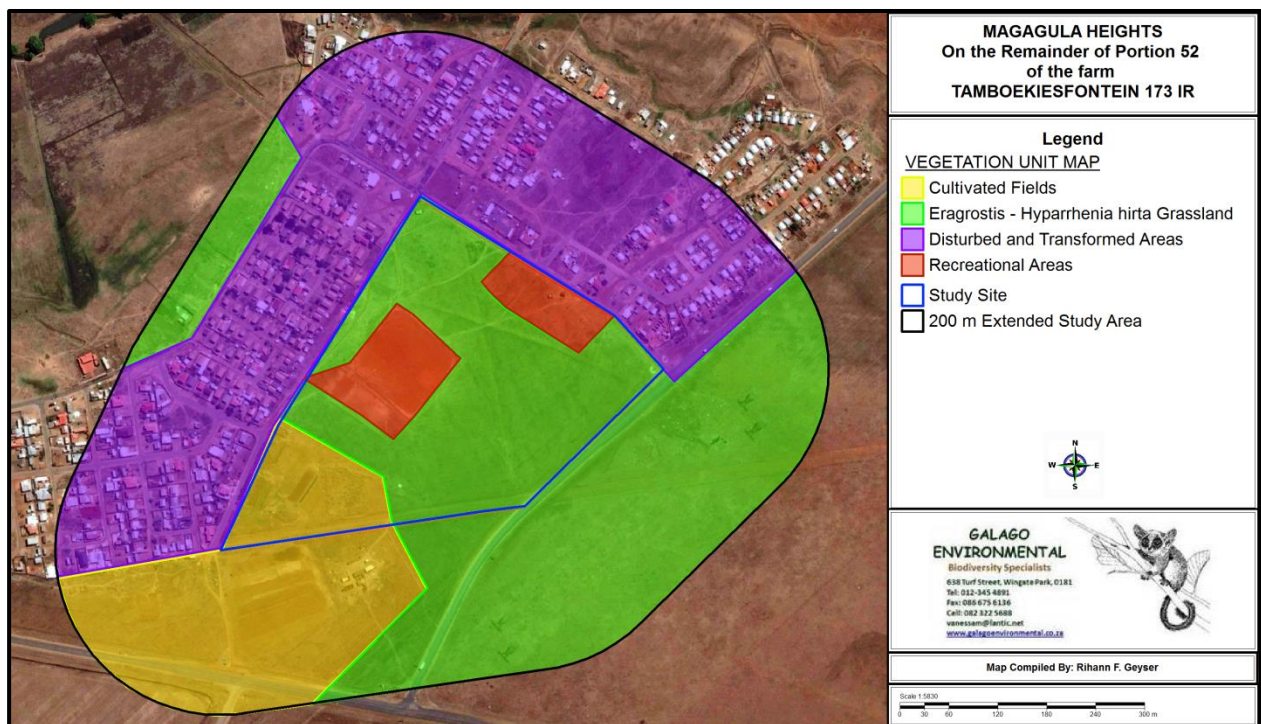


Figure 3: Vegetation study units identified on the study site

6. RESULTS

6.1 Vegetation study units

Three vegetation study units were identified on the study site:

- *Eragrostis – Hyparrhenia hirta* grassland;
- Cultivated fields; and
- Recreational areas.

The site abuts the Totally destroyed built-up areas along the northern and western boundaries. Tables 3 to 5 list the plants found on each of the surveyed areas of the study site.

6.2 Medicinal plants

The names of known medicinal plants are marked with numbers in Tables 3 to 5 and the numbers appear as footnotes at the end of the last table. Of the 44 plant species recorded on the site, eight species with medicinal properties were found. The distribution of the medicinal species in the study units is as follows:

Table 1: Number of medicinal species in the various study units

STUDY UNIT	TOTAL NO. OF SPECIES IN STUDY UNIT	NO. OF MEDICINAL SPECIES IN STUDY UNIT
<i>Eragrostis – Hyparrhenia hirta</i> grassland	33	8
Cultivated fields	17	2
Recreational areas	21	3

6.3 Alien plants

Alien plants are not listed separately, but are included in the lists as they form part of each particular study unit. Their names are marked with an asterisk in Tables 3 to 5. Ten alien plant species, of which 4 species are Category 1b invasive species and one species is a Category 2 invasive species were recorded on the site. The number of alien species in each study unit is reflected in table 2.

Table 2: Number of Alien species in each study unit

STUDY UNIT	NO. OF ALIEN SPECIES	CAT 1b	CAT 2	NOT LISTED
<i>Eragrostis – Hyparrhenia hirta</i> grassland	3	1	0	2
Cultivated fields	5	1	0	4
Recreational areas	7	3	1	3

Invasive species are controlled by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.

Category 1b: Invasive species which must be controlled and wherever possible, removed and destroyed. Any form of trade or planting is strictly prohibited.

Category 2: Invasive species, or species deemed to be potentially invasive, in that a permit is required to carry out a restricted activity. Category 2 species include commercially important species such as pine, wattle and gum trees. Plants in riparian areas become Category 1b invasive species.

6.4 Orange List species on the study site

Three Orange List plant species are known to occur in the 2628AC quarter degree square. The study site does not have suitable habitat for any of these species (See Annexure A for a list of the Orange List and Red List species known to occur in the quarter degree square).

6.5 Red List species on the study site

Twelve Red List plant species are known to occur in the 2628AC quarter degree square, two of these in the near vicinity of the study site (Annexure A indicates the two Red List species previously found in the near vicinity of the study site). The site does not have suitable habitat for any of these species. GDARD does not require biodiversity studies for any particular plant species.

6.6 Protected trees and other protected species

No Protected trees, listed in terms of the National Forests Act, 1998 (Act No. 84 Of 1998) or protected plant species listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) are known to occur in the 2628AC quarter degree square.

6.7 *Eragrostis – Hyparrhenia hirta* grassland

6.7.1 Compositional aspects and Connectivity

The *Eragrostis – Hyparrhenia hirta* grassland on the site comprises secondary grassland with no visible geophytes. It is clear from the floral diversity that the site was ploughed in the past. Because few weedy species are present it is surmised that the site was planted with pasture grasses. Connectivity with natural grassland exists to the south but is limited by Road R550. Of the 44 plant species recorded on the site 33 were recorded in the *Eragrostis – Hyparrhenia hirta* grassland study unit. Of these 30 are indigenous species. The following number of species in each growth form was noted:

GROWTH FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	23
Shrubs and dwarf shrubs	1
Grasses	8
Sedges	1
Total number of species	33

6.7.2 Red List and Orange List species in the study unit

The *Eragrostis – Hyparrhenia hirta* grassland study unit does not have suitable habitat for the Red List or Orange List plant species known to occur in the 2628AC quarter degree square.

6.7.3 Medicinal and alien species

The eight medicinal species recorded on the site were all found in this study unit. Three alien species were recorded in this study unit. Of the alien species one is a Category 1b invasive species.

6.7.4 Sensitivity

Although the *Eragrostis – Hyparrhenia hirta* grassland study unit is situated in a Critical Biodiversity area, this study unit comprises secondary grassland and is not deemed sensitive.



Figure 4: *Eragrostis – Hyparrhenia hirta* grassland

Table 3: Plants recorded in the *Eragrostis – Hyparrhenia hirta* grassland

SCIENTIFIC NAME	INV CAT	COMMON NAMES
<i>Aristida congesta</i> subsp. <i>congesta</i>		Tassle three-awn grass / Katstertsteekgras
<i>Bidens pilosa</i> *		Blackjack / Knapsekêrel
<i>Conyza podocephala</i>		
<i>Cynodon dactylon</i>		Couch grass / Kweek
<i>Cyperus esculentus</i> var. <i>esculentus</i>		Yellow nutsedge / Geeluintjie
<i>Datura stramonium</i> *	1b	Common thorn apple / Olieboom
<i>Eragrostis chloromelas</i>		Curly leaf / Krulblaar
<i>Eragrostis curvula</i>		Weeping love grass / Oulandsgras
<i>Felicia muricata</i> subsp. <i>muricata</i> ³		White felicia / Blouheuning karooblom
<i>Gazania krebsiana</i> subsp. <i>serrulata</i> ³		Common gazania / Botterblom
<i>Helichrysum nudifolium</i> var. <i>nudifolium</i> ^{1,2}		Hottentot's tea / Hottentotstee
<i>Helichrysum rugulosum</i> ^{2,3}		
<i>Hermannia depressa</i> ^{2,3}		Creeping red hermannia / Rooiopslag
<i>Hilliardiella oligocephala</i> ^{1,2}		Cape veronia / Blounaaldetee bossie
<i>Hyparrhenia hirta</i>		Common thatching grass / Dekgras
<i>Hyparrhenia tamba</i>		Blue thatching grass / Blou tamboekiegras
<i>Lactuca inermis</i>		Wild lettuce
<i>Lotononis calycina</i>		Hairy lotononis
<i>Monsonia angustifolia</i>		Crane's bill / Angelbossie
<i>Nemesia fruticans</i>		Wilde leeubekkie
<i>Pelargonium luridum</i> ^{1,2}		Stalkflowered pelonium / Wildemalva
<i>Plantago lanceolata</i> ³		Buckhorn plantain / Small weëblaar
<i>Pogonarthria squarrosa</i>		Herring bone grass / Sekelgras
<i>Pollichia campestris</i>		Waxberry / Teesuikerbossie
<i>Senecio erubescens</i> var. <i>erubescens</i>		
<i>Senecio inaequidens</i>		Canary weed / Geelopslag
<i>Seriphium plumosum</i>		Bankrupt bush / Bankrotbos
<i>Solanum delagoense</i>		Poison apple / Gifappel
<i>Solanum lichtensteinii</i>		Giant bitter apple / Bitterappel
<i>Tagetes minuta</i> *		Tall khaki weed / Lang kakiebos
<i>Teucrium trifidum</i>		Koorsbossie
<i>Themeda triandra</i>		Red grass / Rooigras
<i>Tolpis capensis</i>		

INV CAT = Invasive species category

6.8 Cultivated fields

6.8.1 Compositional aspects

This study unit comprises mostly vegetable fields, especially cabbage fields planted by one of the residents of Magagula Heights Township (personal comm.). Of the 44 plant species recorded on the site 17 were recorded in the Cultivated fields study unit. Of these 12 are indigenous species. The following number of species in each growth form was noted:

GROWTH FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	12
Grasses	4
Sedges	1
Total number of species	17

6.8.2 Red List and Orange List species in the study unit

The Cultivated fields study unit does not have suitable habitat for the Red List or Orange List plant species known to occur in the 2628AC quarter degree square.

6.8.3 Medicinal and alien species

Two medicinal species were recorded in this study unit. Five of the 10 alien species recorded on the site were found in this study unit. Of the alien species one is a Category 1b invasive species.

6.8.4 Sensitivity

Although the Cultivated fields study unit is situated in a Critical Biodiversity area this study unit comprises mostly vegetable fields and is not considered sensitive.



Figure 5: Cultivated fields

Table 4: Plants recorded in the Cultivated fields

SCIENTIFIC NAME	INV CAT	COMMON NAMES
<i>Aristida congesta</i> subsp. <i>congesta</i>		Tassle threeawn grass / Katstertsteekgras
<i>Bidens pilosa</i> *		Blackjack / Knapsekêrel
<i>Brassica oleracea</i> var. <i>capitata</i> *		Cabbage / Kopkool
<i>Citrillus lanatus</i>		Makataan
<i>Conyza podocephala</i>		
<i>Cynodon dactylon</i>		Couch grass / Kweek
<i>Cyperus esculentus</i> var. <i>esculentus</i>		Yellow nutsedge / Geeluintjie
<i>Datura stramonium</i> *	1b	Common thorn apple / Olieboom
<i>Eragrostis chloromelas</i>		Curly leaf / Krulblaar
<i>Helichrysum rugulosum</i> ^{2,3}		
<i>Hyparrhenia tamba</i>		Blue thatching grass / Blou tamboekiegras
<i>Ipomoea batatas</i> *		Sweet potato / Patats
<i>Lactuca inermis</i>		Wild lettuce
<i>Monsonia angustifolia</i>		Crane's bill / Angelbossie
<i>Plantago lanceolata</i> ³		Buckhorn plantain / Small weëblaar
<i>Senecio inaequidens</i>		Canary weed / Geelopslag
<i>Tagetes minuta</i> *		Tall khaki weed / Lang kakiebos

INV CAT = Invasive species Category

6.9 Recreational areas

6.9.1 Compositional aspects

This study unit consists of a soccer field near the western boundary of the site and an informal park area along the eastern boundary of the site. The ground for the soccer field has been cleared of tall grasses, but the grass of the park area has been mown and trees and ornamental species planted. Of the 44 plant species recorded on the site 21 were recorded in the Recreational areas study unit. Of these 14 are indigenous species. The following number of species in each growth form was noted:

GROWTH FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	8
Tree species	3
Shrubs and dwarf shrubs	1
Grasses	6
Sedges	1
Succulents	2
Total number of species	21

6.9.2 Red List and Orange List species in the study unit

The Recreational areas study unit does not have suitable habitat for the Red List or Orange List plant species known to occur in the 2628AC quarter degree square.

6.9.3 Medicinal and alien species

Three of the eight medicinal species and seven of the 10 alien species recorded on the site were found in this study unit. Of the alien species three are Category 1b invasive species and one is a Category 2 invasive species.

6.9.4 Sensitivity

Although the park area of this study unit is situated in a Critical Biodiversity area and the soccer field in an Ecological support area, this study unit is not deemed sensitive.



Figure 6: Mown grass of an informal park



Figure 7: Soccer field

Table 5: Plants recorded in the Recreational areas

SCIENTIFIC NAME	INV CAT	COMMON NAMES
<i>Agave sisalina</i> *	2	Sisal / Garingboom
<i>Aristida congesta</i> subsp. <i>congesta</i>		Tassle threeawn grass / Katstertsteekgras
<i>Arundo donax</i> *	1b	Spanish reed / Spaanse riet
<i>Austrocylindropuntia subulata</i> *	1b	Long spine cactus
<i>Bidens pilosa</i> *		Blackjack / Knapsekêrel
<i>Celtis africana</i>		White stinkwood / Witstinkhout
<i>Cereus jamacaru</i> *	1b	Queen of the night / Nagblom
<i>Combretum erythrophyllum</i>		River bushwillow / Rivier-vaderlandswilg
<i>Conyza podocephala</i>		
<i>Cynodon dactylon</i>		Couch grass / Kweek
<i>Cyperus esculentus</i> var. <i>esculentus</i>		Yellow nutsedge / Geeluintjie

SCIENTIFIC NAME	INV CAT	COMMON NAMES
<i>Felicia muricata</i> subsp. <i>muricata</i> ³		White felicia / Blouheuning karooblom
<i>Hyparrhenia hirta</i>		Common thatching grass / Dekgras
<i>Pelargonium luridum</i> ^{1,2}		Stalkflowered pelonium / Wildemalva
<i>Pennisetum clandestinum</i> *		Kikuyu / Kikoejoe
<i>Plantago lanceolata</i> ³		Buckhorn plantain / Small weëblaar
<i>Pogonarthria squarrosa</i>		Herring bone grass / Sekelgras
<i>Searsia lancea</i>		Karee / Karee
<i>Senecio inaequidens</i>		Canary weed / Geelopslag
<i>Solanum lichtensteinii</i>		Giant bitter apple / Bitterappel
<i>Tagetes minuta</i> *		Tall khaki weed / Lang kakiebos

INV CAT = Invasive species category

¹⁾ Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. 2002.

²⁾ Watt, J.M. & Breyer-Brandwijk, M.G. 1962.

³⁾ Pooley, E. 1998.

7 LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

Sufficient information was received to accomplish the survey. Most grasses still had inflorescences as a result of the late summer rains and could be identified.

8 FINDINGS AND POTENTIAL IMPLICATIONS

The *Eragrostis – Hyparrhenia hirta* grassland study unit on the site is secondary grassland and is situated within a Critical Biodiversity area. The Cultivated fields and the Recreational areas study units are likewise situated within a Critical Biodiversity area, except the soccer field which is in an Ecological support area. None of these units were considered sensitive.

9 RECOMMENDED MITIGATION MEASURES

The following mitigation measures were developed by GDARD 2014 (Department of Agriculture and Rural Development, Biodiversity Management Directorate) and are applicable to the study site:

- An appropriate management authority (e.g. the body corporate) that must be contractually bound to implement the Environmental Management Plan (EMP and Record of Decision (ROD) during the operational phase of the development should be identified and informed of their responsibilities in terms of the EMP and ROD.
- Only indigenous plant species, preferably species that are indigenous to the natural vegetation of the area, should be used for landscaping in communal areas. As far as possible, plants naturally growing on the development site, but would otherwise be destroyed during clearing for development purposes, should be incorporated into landscaped areas. Forage and host plants required by pollinators should also be planted in landscaped areas.

10 CONCLUSION

In this survey it was found that the *Eragrostis – Hyparrhenia hirta* grassland study unit is secondary grassland, and although situated in a Critical Biodiversity Area, is not deemed sensitive. Although the Cultivated fields and the Recreational areas study units are likewise situated within a Critical Biodiversity area and in an Ecological support area, they are not considered sensitive. The alien invasive species should be removed. No Red List or Orange List species occur on the study site.

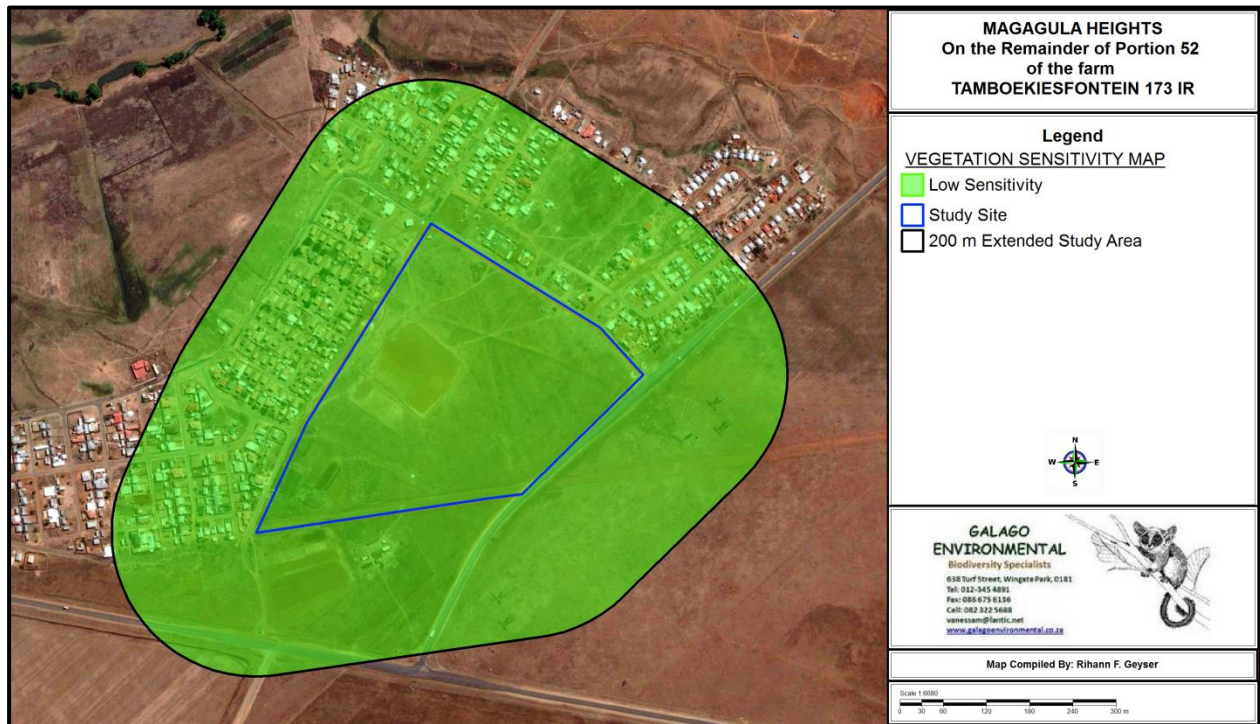


Figure 8: Vegetation sensitivity map

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ANNEXURE A: Red List and Orange List* plants of the 2628AC q.d.s.

Species	Flower season	Suitable habitat	Priority group	Conserv status	Presence on site
#▲ <i>Argyrobium campicola</i>	Nov-Feb	Highveld grassland.	A3	Near Threatened ¹	Habitat not suitable
<i>Boophane disticha</i>	Oct-Jan	Dry grassland and rocky areas.	N/A	Declining ²	Habitat not suitable
<i>Bowiea volubilis</i> subsp. <i>volubilis</i>	Sep-Apr	Shady places, steep rocky slopes and in open woodland, under large boulders in bush or low forest.	B	Vulnerable ²	Habitat not suitable
<i>Cineraria longipes</i>	Mar-May	Grassland, on koppies, amongst rocks and along seepage lines, exclusively on basalt on south-facing slopes.	A1	Vulnerable ¹	Habitat not suitable
<i>Delosperma purpureum</i>	Aug-Mar	South facing slopes, grows in shallow soils among quartzitic rocks of crystalline or conglomerate type, in open or in broken shade, rarely in shade, in grassland with some trees.	A1	Endangered ¹	Habitat not suitable
<i>Dioscorea sylvatica</i>	Oct-Jan	Wooded places with fair to reasonably good rainfall, such as the moister bushveld areas, coastal bush and wooded mountain kloofs.	B	Vulnerable ²	Habitat not suitable
<i>Eucomis autumnalis</i>	Nov-Apr	Damp, open grassland and sheltered places.	N/A	Declining ²	Habitat not suitable
<i>Eulophia coddii</i>	Early Dec	Steep hillsides on soil derived from sandstone, grassland or mixed bush.	A2	Vulnerable ¹	Habitat not suitable
<i>Habenaria mossii</i>	Mar-Apr	Open grassland on dolomite or in black sandy soil.	A1	Endangered ¹	Habitat not suitable
<i>Holothrix micrantha</i>	Oct	Terrestrial on grassy cliffs, recorded from 1500 to 1800m.	A1	Critically Endangered ¹	Habitat not suitable
<i>Holothrix randii</i>	Sep-Oct	Grassy slopes and rock ledges, usually southern aspects.	B	Near Threatened ²	Habitat not suitable
<i>Hypoxis hemerocallidea</i>	Sep-Mar	Occurs in a wide range of habitats; appears to be drought and fire tolerant.	N/A	Declining ²	Habitat not suitable
<i>Khadia beswickii</i>	Jul-Apr	Open areas on shallow surfaces over rocks in grassland.	A1	Vulnerable ¹	Habitat not suitable
#▲ <i>Lithops lesliei</i> subsp. <i>lesliei</i>	Mar-Jun	Primary habitat appears to be the arid grasslands in the interior of South Africa where it usually occurs in rocky places, growing under the protection of surrounding forbs and grasses.	A3	Near Threatened ²	Habitat not suitable
<i>Stenostelma umbelluliferum</i>	Sep-Mar	Deep black turf in open woodland mainly in the vicinity of drainage lines.	A3	Near Threatened ¹	Habitat not suitable

¹) global status

²) national status

* Orange listed plants have no priority grouping and are designated 'N/A'

Populations of this taxon present on study site or in the near vicinity of the study site (distance given in brackets)

▲ Has been recorded from the farm on which the study site is situated / within 5km of the study site. Should suitable habitat be present, it is highly likely that this species occur on the study site.